

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
7 October 2004 (07.10.2004)

PCT

(10) International Publication Number
WO 2004/085466 A3

(51) International Patent Classification⁷: **C07K 14/16,**
A61K 39/21

(21) International Application Number:
PCT/US2004/009767

(22) International Filing Date: 26 March 2004 (26.03.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/458,880 28 March 2003 (28.03.2003) US

(71) Applicant (for all designated States except US): THE GOVERNMENT OF THE UNITED STATES OF AMERICA, AS REPRESENTED BY THE SECRETARY OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES [US/US]; Technology Transfer Office, 4770 Buford Highway (K79), Atlanta, GA 30341 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): LAL, Renu, B. [US/US]; 9000 New Delhi Place, Dulles, VA 20189-9000 (US). OWEN, Sherry, M. [US/US]; 5679 Charlton Way, Douglasville, GA 30135 (US).

(74) Agent: CASH, David; Klarquist Sparkman, LLP, Suite 1600, One World Trade Center, 121 Southwest Salmon Street, Portland, OR 97204 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- of inventorship (Rule 4.17(iv)) for US only
- of inventorship (Rule 4.17(iv)) for US only

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
24 March 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: IMMUNOGENIC HIV-1 MULTI-CLADE, MULTIVALENT CONSTRUCTS AND METHODS OF THEIR USE

(57) Abstract: Described herein are nucleic acid molecules which encode multiple highly conserved epitopes from HIV-1 proteins, and optionally also epitopes from CCR5; usually also included sequences that encode spacers between two or more of the epitopes. Some of the provided nucleic acid molecules further include sequences that encode targeting domains, useful for targeting the encoded protein into a pathway for enhancing epitope presentation in a vertebrate immune system. Also described are multivalent proteins encoded for by these nucleic acid molecules. The disclosure also encompasses immunogenic compositions that comprise one or more of the nucleic acid molecules, and/or one or more of the proteins encoded thereby, as well as methods of inducing an immune response against HIV-1 in a subject by administering to the subject an effective amount of a composition containing one or more of these molecules. Also provided are cultured host cells containing within them one or more of the described nucleic acid molecules.

WO 2004/085466 A3

INTERNATIONAL SEARCH REPORT

Int^l Application No
PC 1/US2004/009767

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C07K14/16 A61K39/21

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, WPI Data, Sequence Search, MEDLINE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LACASSE R ET AL: "Fusion-competent vaccines: Broad neutralization of primary isolates of HIV" SCIENCE, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE,, US, vol. 283, no. 5400, 15 January 1999 (1999-01-15), pages 357-362, XP002120812 ISSN: 0036-8075 the whole document ----- -/--	1-26

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the International filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the International search

2 December 2004

Date of mailing of the international search report

11/01/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Young, C

INTERNATIONAL SEARCH REPORT

In International Application No
PCT/US2004/009767

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>SINGH RANA A K ET AL: "Generation of genome-wide CD8 T cell responses in HLA-A*0201 transgenic mice by an HIV-1 ubiquitin expression library immunization vaccine." JOURNAL OF IMMUNOLOGY, vol. 168, no. 1, 1 January 2002 (2002-01-01), pages 379-391, XP002308576 ISSN: 0022-1767 the whole document</p>	1-26
X	<p>LU: "HIV-1 Gag DNA Vaccine Chimera with Expression and Adjuvant Properties of the Lysosomal-Associated Membrane Protein (LAMP) and Dendritic Cell Multi-Lectin Receptor (DC-MLR) in an AAV-ITR Plasmid Vector" AIDS VACCINE CONFERENCE ABSTRACT, 'Online! 7 September 2001 (2001-09-07), XP002308577 Retrieved from the Internet: URL:http://63.84.172.40/Posters/312.1.pdf> 'retrieved on 2004-12-01! the whole document</p>	1-26
X	<p>EP 1 130 089 A (DEUTSCHES KREBSFORSCH) 5 September 2001 (2001-09-05) the whole document</p>	1-26
A	<p>OWEN SHERRY M ET AL: "Susceptibility of diverse primary HIV isolates with varying co-receptor specificity's to CXCR4 antagonistic compounds" JOURNAL OF MEDICAL VIROLOGY, vol. 68, no. 2, October 2002 (2002-10), pages 147-155, XP009040950 ISSN: 0146-6615 the whole document</p>	1-26
T	<p>KONG WING-PUI ET AL: "Immunogenicity of multiple gene and clade human immunodeficiency virus type 1 DNA vaccines." JOURNAL OF VIROLOGY, vol. 77, no. 23, December 2003 (2003-12), pages 12764-12772, XP002308579 ISSN: 0022-538X the whole document</p>	1-26

INTERNATIONAL SEARCH REPORT

national application No.

PCT/US2004/009767

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.b of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:
 - a. type of material
 - ☒ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material
 - ☒ in written format
 - ☒ in computer readable form
 - c. time of filing/furnishing
 - ☒ contained in the international application as filed
 - ☐ filed together with the international application in computer readable form
 - ☒ furnished subsequently to this Authority for the purpose of search
2. ☒ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
3. Additional comments:

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/JP2004/009767

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1130089	A	05-09-2001	EP 1130089 A1	05-09-2001